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the text, twenty-five pages of notes. There are both advance and review questions upon the notes in this speech.

There are ample introductions to the several speeches, upon the subject-matter, and an appendix of fifteen pages upon "The Last Century of the Republic," "Duties of the Assemblies," and "Notes on the Magistrates." The notes are supplied with abundant references to the grammars of Gildersleeve, Allen and Greenough, Bennett, and Harkness, with a good deal of additional syntactical comment and with frequent translations, after the usual fashion. It is but just to add that sometimes questions are asked and the literal translation put by the side of the free.

The material for reading, it will be noted, is large. The eleven orations are given without abridgment, and are as follows: the four against Catiline, Verres (Actio Prima), the Manilian Law, Archias, Milo, Marcellus, Ligarius, and the Ninth Philippic. The author does not believe in the somewhat common practice of giving a few of the letters with the orations; their style and content he thinks too different, and unsuited to the pupil. The vowels are unmarked, except in the Ninth Philippic.

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Experimental Chemistry. By LYMAN C. NEWELL. D. C. Heath & Co., 1900. Price, \$1.10.

Teachers' Supplement to the above.

Richter's Inorganic Chemistry. Translated by EDGAR F. SMITH. Fifth edition. Blakiston, Philadelphia, Pa.: 1900. Price, \$1.75.

COMMON as new text-books of chemistry for high-school work have become, the former of these two works is worthy of special notice on account of some innovations which its arrangement presents. An attempt is made to investigate, either in the class room or the laboratory, the proportions by weight in a number of typical compounds, and the author professes to have connected the results of these with the theory in such a manner as to provide a firm foundation for the latter. The selection of such experiments is in most cases judicious, although we have not observed any novelties, and the directions are sufficiently explicit for carrying them out. The book does not pretend to give a complete account of the subject-matter which should make up the course. It appears to be intended very largely to supply the connective tissue and to carry the thread of the theory. In each chapter an elaborate list of topics and references shows how each subject may be pursued historically and in the direction of a wider basis of fact and a more complete elaboration of the theory. The references should be of great value to the teacher, although much judgment will be required, since it would be easy to produce a most unbalanced course by giving undue weight to one or other of the above aspects of each subject. The *Teachers' Supplement*, which is supplied to teachers only, gives answers to the many problems in the book, valuable hints in regard to the nature of the apparatus to be provided and the best mode of purchasing it, "tips" in regard to various laboratory operations, and many hints in didactics.

Unfortunately the program has not been carried out so successfully as we could

have wished. We note a tendency to elaborate subjects in the text and by means of the references, while the fundamental things which underlie the subject are passed over without explanation. Thus, for example, efflorescence and deliquescence are explained in a way which would be quite clear to a student perfectly familiar with the phenomena of vapor tension and its lowering by the presence of substances in solution. If the introduction of these two topics implies that the teacher is expected to prepare the pupil for them by the necessary foundation work, and the numerous other cases in connection with which the same criticism could be made are intended to be treated in the same manner, the whole course would be fairly extensive for a university. To give one other example, after the proportions by weight of the constituents of some compounds have been measured, the chemical equation is discussed. We are surprised to find, however, that instead of combining weights being used as the basis for the symbol, the *atom* and *molecule* are suddenly mentioned for the first time, without the least explanation. We fear that the proper linkage of the measurement of weight with the construction of the equation could never be grasped by any beginner from Mr. Newell's account of it. He says of chemical equations, "They are the result of experiment." He then puts together the symbols representing one of the quantitative experiments and adds, "This equation means that one atom of magnesium unites with one atom of oxygen and forms one molecule of magnesium oxide." The beginner will not be able to find anything like counting of atoms in the experiment in question.

The treatment of chemical theory is certainly exceedingly difficult, and we should hesitate to say that any given treatment, if correct, could not be used by a skillful teacher in the instruction of an intelligent class; but the whole theory is presented by Mr. Newell in what appears to us to be such a topsy-turvy fashion, that we should feel grave doubts in regard to the success with which the average teacher could use the book.

Two serious errors in the table on p. 144 will probably prevent the reader from understanding the connection between density and molecular weight, and, by almost destroying this important link in the chain, make a proper understanding of the determination of atomic and molecular weights impossible. Even if this were remedied, the treatment of this subject, while very good in parts, is unfortunate in its arrangement.

Richter's *Inorganic Chemistry* is so well known that a detailed criticism of the book is not required. The fifth American edition is a great improvement upon the fourth edition, published four years ago. The quantity of matter in the book is considerably greater, and the nature of the additions as well as of the changes which have been made in the original text cannot but be commended in every part. The book has been practically rewritten. We note the introduction of the idea of equilibrium and its discussion in connection with typical examples; the adoption of atomic weights with the basis $o = 16$; reference to the electric furnace and to carbides, and an excellent outline of the electrolytic theory of solution. It would perhaps have been too much to expect that the latter should have disseminated its influence beyond the chapter in which it is treated specifically. Taken as a whole the book presents in a compact form a remarkably clear account of everything that makes up elementary general chemistry.

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